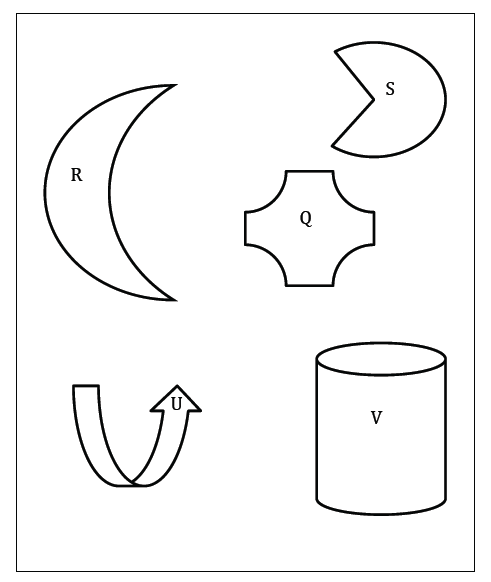
Concept of congruence  
8 TH GRADE

Classwork – Partner Activity

Trace the box and one of the shapes on a transparency. Transform your shape to a new location within the box and trace your shape at the new location. Write a description of your transformation. Read your description to your partner so they can draw (or trace) a picture of your shape in its new location.

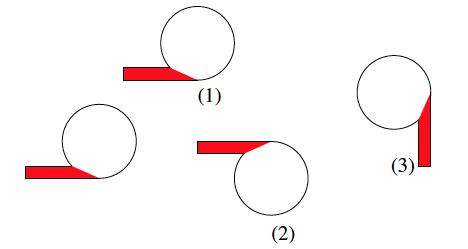


Lesson 1: Why Move Things Around?

Classwork

Exploratory Challenge

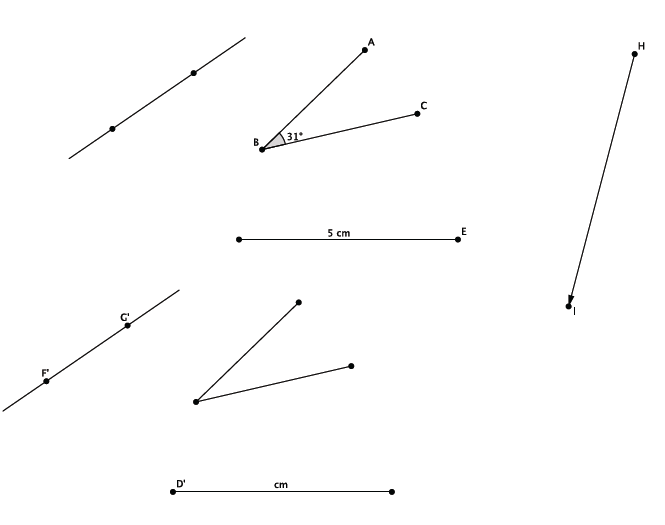
1. Describe, intuitively, what kind of transformation will be required to move the figure on the left to each of the figures (1)–(3) on the right. To help with this exercise, use a transparency to copy the figure on the left. Note: Begin by moving the left figure to each of the locations in (1), (2), and (3).



Lesson 2: Definition of Translation and Three Basic Properties

Exercise 2

The diagram below shows figures and their images under a translation along . Use the original figures and the translated images to fill in missing labels for points and measures.



Lesson 4: Definition of Reflection and Basic Properties

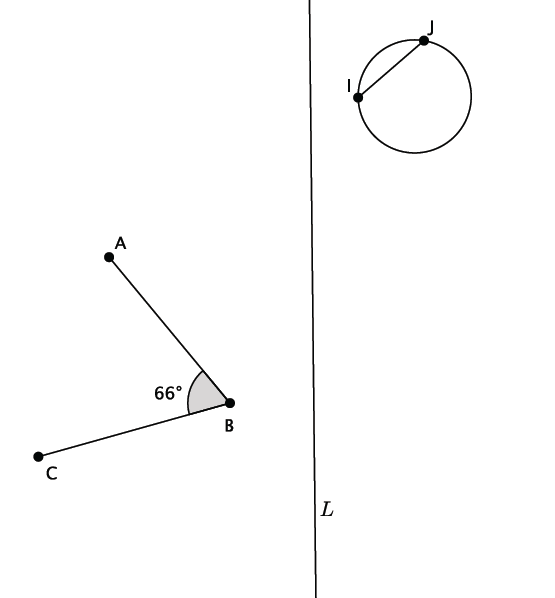
Classwork

**Exercises**

1. Reflect and Figure across line . Label the reflected images.

Macintosh HD:Users:shassan:Dropbox:Module 2:Images:Def of Reflection:ex 1s.pdf

1. Which figure(s) were not moved to a new location on the plane under this transformation?
2. Reflect the images across line . Label the reflected images.



1. Answer the questions about the image above.
   1. Use a protractor to measure the reflected . What do you notice?
   2. Use a ruler to measure the length of and the length of the image of after the reflection. What do you notice?

Use the picture below for Exercises 5-8.

Macintosh HD:Users:shassan:Desktop:ex 6s.pdf

1. Use the picture to label the unnamed points.
2. What is the measure of ? ? ? How do you know?
3. What is the length of segment ? ? How do you know?
4. What is the location of ? Explain.

Classwork

Letthere be a rotation of degrees around center . Find *P’* (i.e., the rotation of point *P*) using a transparency.



Describe your rotation below.

Read your description to a partner and have them draw the rotation.

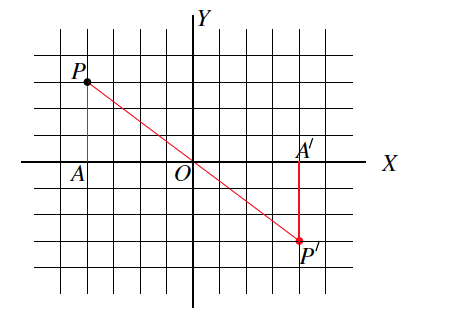
Compare your drawing to your partner’s. How are they the same? How are they different?

What words would you use to make sure that your drawings are the same?

Lesson 6: Rotations of 180 Degrees

Classwork

**Example 2**

The picture below shows what happens when there is a rotation of around center , the origin of the coordinate plane.

List the coordinates of *P* and *P’* and *A* and *A’* in the space below.

Exercises

1. Macintosh HD:Users:shassan:Desktop:ex 1t copy.pdfRotate the point (2, -4) about the origin. Let this rotation be. What are the coordinates of your new point?
2. Macintosh HD:Users:shassan:Desktop:ex 1t copy.pdf Rotate the point (-3, 5) about the origin. Let this rotation be. What are the coordinates of your new point?

Macintosh HD:Users:shassan:Dropbox:Module 2:Images:New Sequence Trans Lesson Images:exploratory challenge 1.pdfLesson 7: Sequencing Translations

Classwork

Exploratory Challenge

* 1. Translate and segment along vector Label the translated images appropriately, i.e., and .
  2. Translate and segment along vector Label the translated images appropriately, i.e., and
  3. How does the size of compare to the size of ?
  4. How does the length of segment compare to the length of the segment ?
  5. Why do you think what you observed in parts (d) and (e) were true?

1. Translate along vector and then translate its image along vector . Be sure to label the images appropriately.

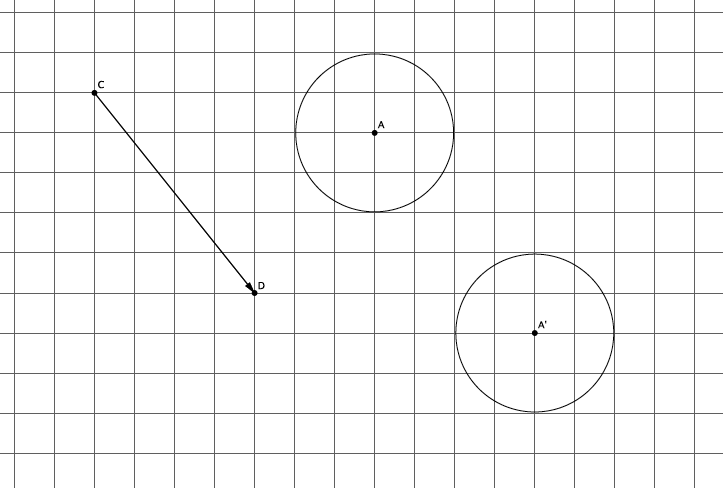
Macintosh HD:Users:shassan:Dropbox:Module 2:Images:Sequence Translations:translate along FGS.pdf

List the coordinates of your new triangle in the space below.

1. Translate figure along vector . Then translate its image along vector . Label each image appropriately.

**Macintosh HD:Users:shassan:Desktop:compose T.pdf**

List the coordinates of your new figure in the space below.

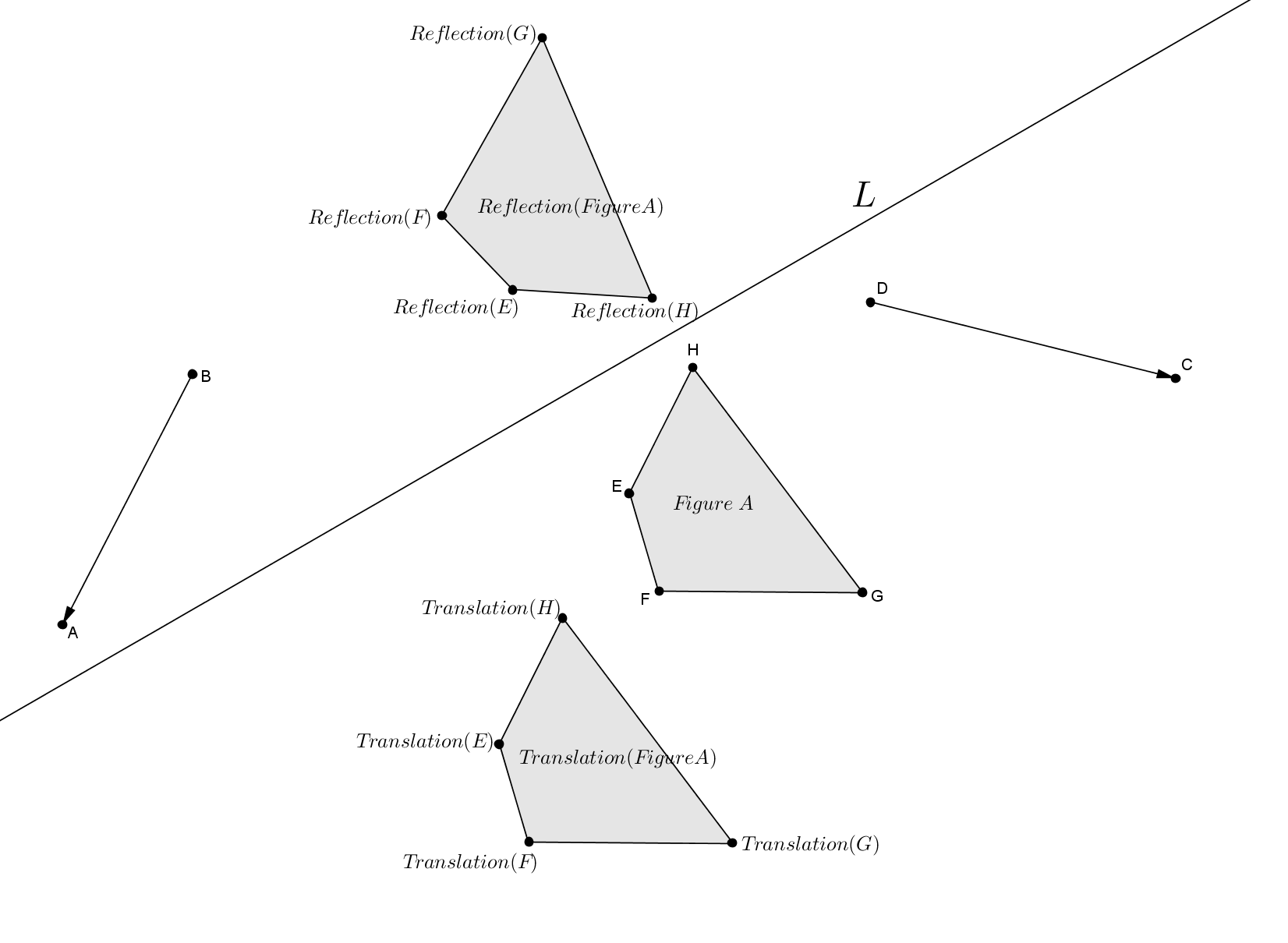
1. The picture below shows the translation of Circle along vector . Name the vector that will map the image of Circle *A* back to its original position.
2. If a figure is translated along vector , what translation takes the figure back to its original location?

Lesson 8: Sequencing Reflections and Translations

Classwork

Exercises 1–3

Use the figure below to answer Exercises 1–3.



1. Figure A was translated along vector resulting in . Describe a sequence of translations that would map Figure A back onto its original position.
2. Figure A was reflected across line resulting in . Describe a sequence of reflections that would map Figure A back onto its original position.

1. Can of Figure A undo the transformation of of Figure A? Why or why not?

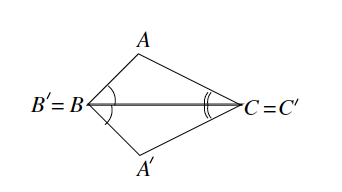
Lesson 10: Sequences of Rigid Motions

Classwork

Exercises

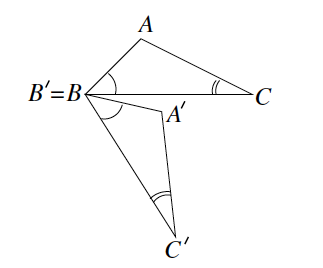
1. In the following picture, triangle can be traced onto a transparency and mapped onto triangle .

Which basic rigid motion, or sequence of, would map one triangle onto the other?

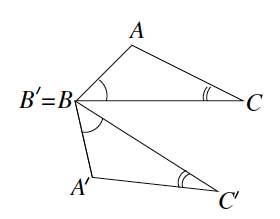


1. In the following picture, triangle can be traced onto a transparency and mapped onto triangle .

Which basic rigid motion, or sequence of, would map one triangle onto the other?

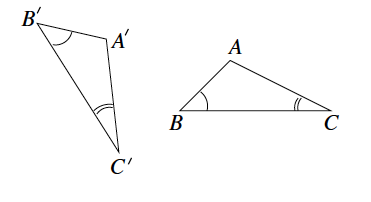


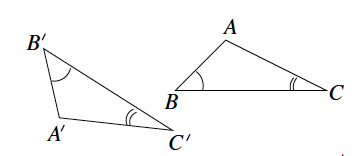
1. In the following picture, triangle can be traced onto a transparency and mapped onto triangle .

Which basic rigid motion, or sequence of, would map one triangle onto the other?

1. In the following picture, we have two pairs of triangles. In each pair, triangle can be traced onto a transparency and mapped onto triangle .

Which basic rigid motion, or sequence of, would map one triangle onto the other?

Scenario 1:

Scenario 2:

Problem Set

1. Let therebe the translation along vector , let there be the rotation around point *,* degrees (clockwise), and let there be the reflection across line . Let be the figure as shown below. Show the location of after performing the following sequence: a translation followed by a rotation followed by a reflection.

Macintosh HD:Users:shassan:Dropbox:Module 2:Images:Sequence Rigid Motions:ps 1 s.pdf

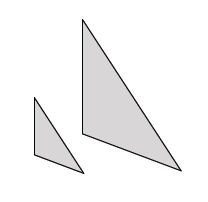
1. Would the location of the image of in the previous problem be the same if the translation was performed last instead of first, i.e., does the sequence: translation followed by a rotation followed by a reflection equal a rotation followed by a reflection followed by a translation? Explain.

Lesson 1: What Lies Behind “Same Shape”? (From Module 3)

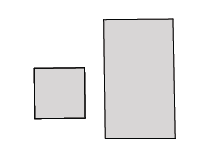
Classwork

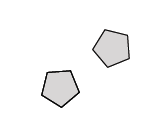
Exploratory Challenge

Two geometric figures are said to be similar if they have the same shape but not necessarily the same size. Using that informal definition, are the following pairs of figures similar to one another? Explain.

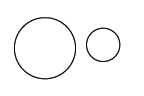


Pair A:

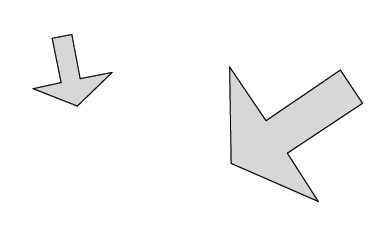
Pair B:

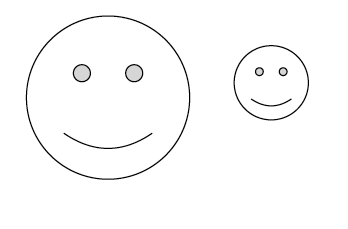


Pair C:

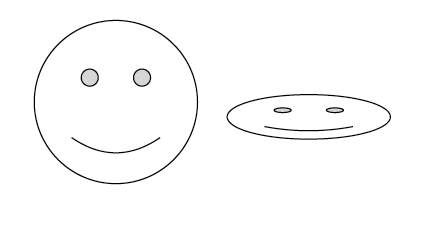


Pair D:

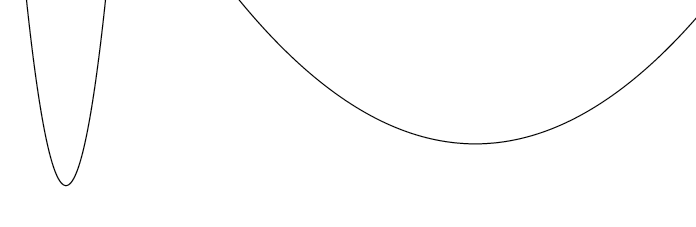
Pair E:



Pair F:



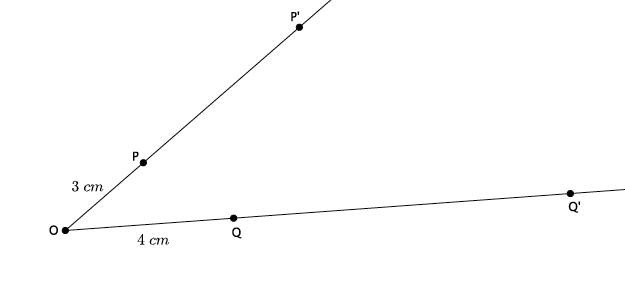
Pair G:

Pair H:

Exercises 1–6

1. Given in.
   1. If segment is dilated by a scale factor *,* what is the length of segment ?
   2. If segment is dilated by a scale factor , what is the length of segment ?

Use the diagram below to answer Exercises 2–6. Let there be a dilation from center . Then and .In the diagram below, cm and cm, as shown.

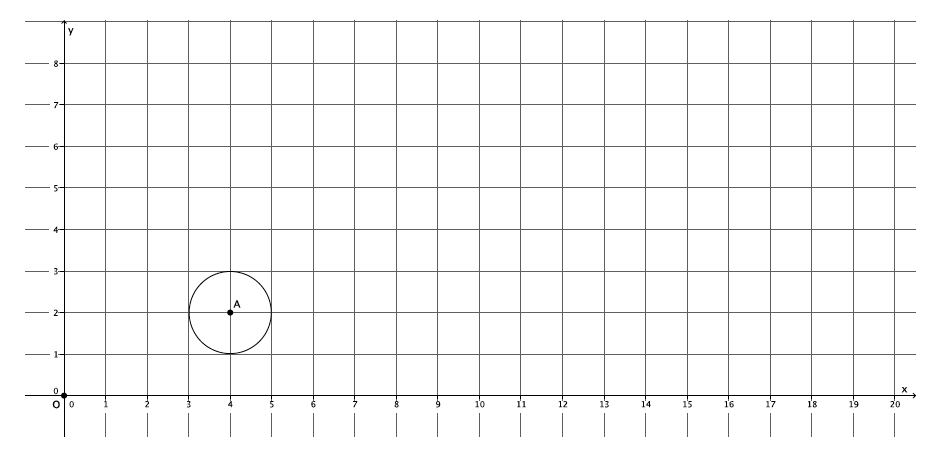


1. If the scale factor is , what is the length of segment ?
2. Use the definition of dilation to show that your answer to Exercise 2 is correct.
3. If the scale factor is , what is the length of segment ?
4. Use the definition of dilation to show that your answer to Exercise 4 is correct.

Lesson 3: Examples of Dilations (from Module 3)

Classwork

**Example 1**

Dilate circle , from center at the origin by scale factor

Exercise

Triangle has been dilated from center by a scale factor of denoted by triangle . Using a ruler, verify that it would take a scale factor of from center to map triangle onto triangle .

Macintosh HD:Users:shassan:Dropbox:Module 3:Images:Examples of dilations:ex3l3s.pdf

Lesson 4: Fundamental Theorem of Similarity (FTS) (from Module 3)

Classwork

Exercise

In the diagram below, points and have been dilated from center by a scale factor of

Macintosh HD:Users:shassan:Desktop:FTS 1.pdf

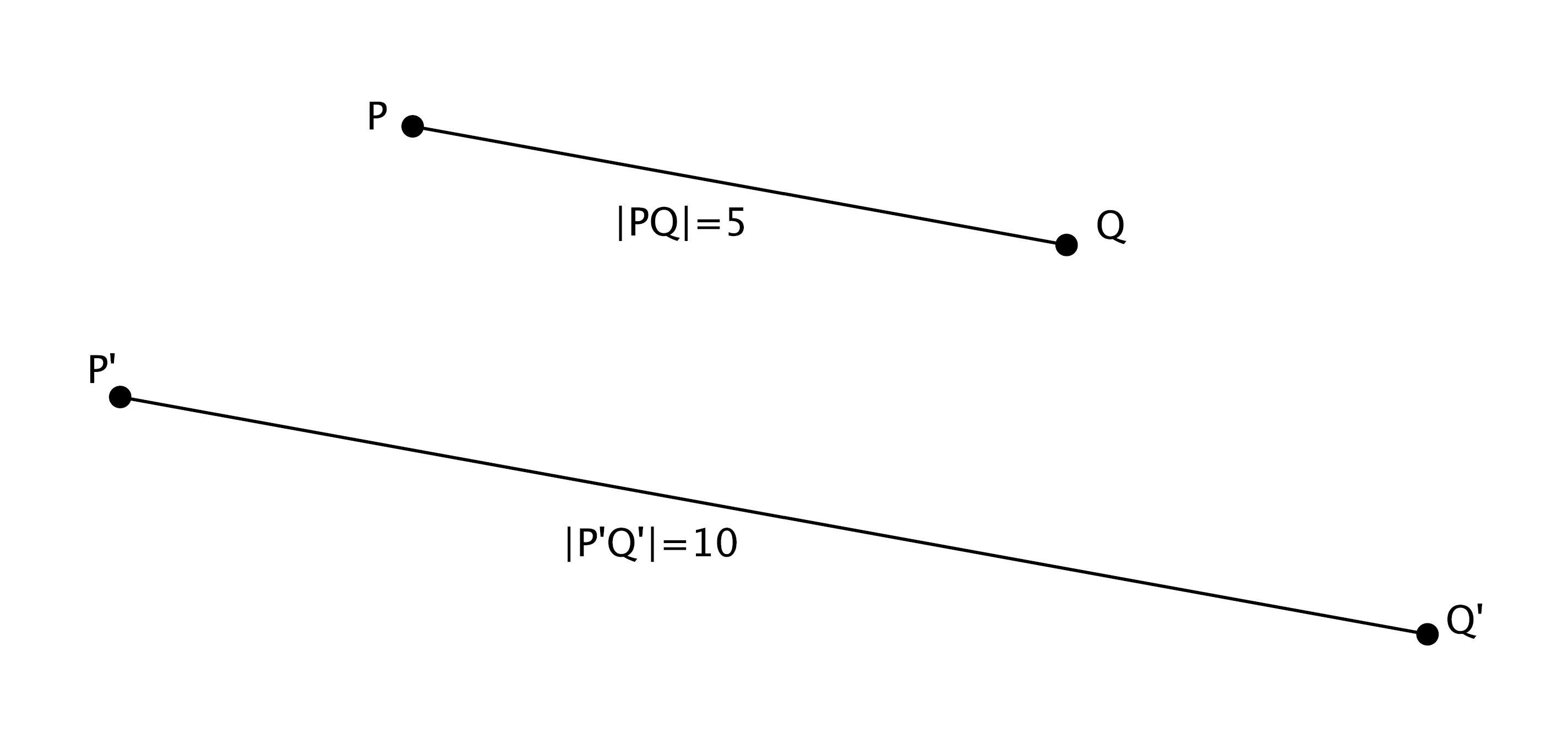
* 1. If the length of cm, what is the length of ?
  2. If the length of cm, what is the length of ?
  3. Connect the point to the point and the point to the point . What do you know about lines and ?
  4. What is the relationship between the length of segment and the length of segment ?

Lesson 5: First Consequences of FTS (from Module 3)

Classwork

Exercise 1

In the diagram below, points and have been dilated from center by scale factor . , cm, and cm.



* 1. Determine the scale factor .
  2. Locate the center of dilation. Measure the segments to verify that and *.* Show your work below.

**Exercise 2**

Macintosh HD:Users:shassan:Dropbox:Module 3:Images:First Conseq of FTS:exer1s.pdfIn the diagram below, you are given center and ray . Point is dilated by a scale factor . Use what you know about FTS to find the location of point .

Exercise 3

Macintosh HD:Users:shassan:Dropbox:Module 3:Images:First Conseq of FTS:exer3s.pdfIn the diagram below, you are given center and ray . Point is dilated by a scale factor . Use what you know about FTS to find the location of point .

Lesson 6: Dilations on the Coordinate Plane (from Module 3)

Classwork

Exercises 1–5

1. Point is dilated from the origin by scale factor . What are the coordinates of point ?
2. Point is dilated from the origin by scale factor . What are the coordinates of point ?
3. Point is dilated from the origin by scale factor . What are the coordinates of point ?
4. Point is dilated from the origin by scale factor . What are the coordinates of point ?
5. Point is dilated from the origin by scale factor . What are the coordinates of point ?

Exercises 6–8

1. Macintosh HD:Users:shassan:Desktop:exer6.pdfThe coordinates of triangle are shown on the coordinate plane below. The triangle is dilated from the origin by scale factor . Identify the coordinates of the dilated triangle .
2. Macintosh HD:Users:shassan:Dropbox:Module 3:Images:Dil on Coord plane New L6 Images:exer7s.pdfFigure is shown on the coordinate plane below. The figure is dilated from the origin by scale factor . Identify the coordinates of the dilated figure , and then draw and label figure on the coordinate plane.
3. The triangle has coordinates ,, and . Draw and label triangle on the coordinate plane. The triangle is dilated from the origin by scale factor Identify the coordinates of the dilated triangle , and then draw and label triangle on the coordinate plane.

Macintosh HD:Users:shassan:Dropbox:Module 3:Images:Dil on Coord plane New L6 Images:exer 8s.pdf

Lesson 8: Similarity (from Module 3)

Classwork

**Example 1**

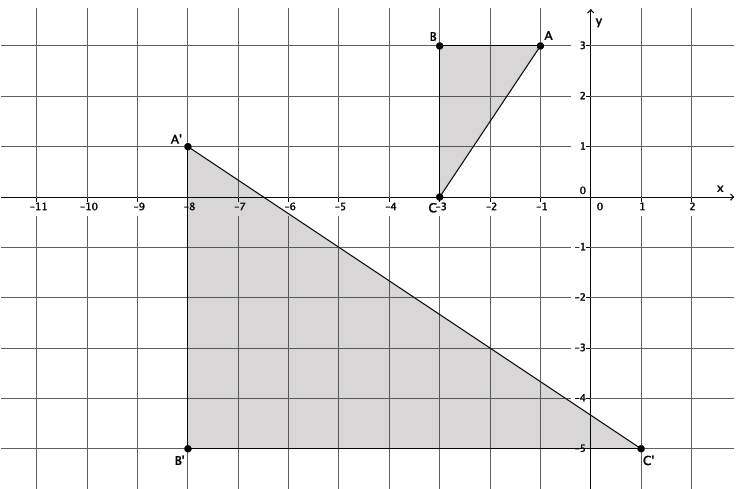
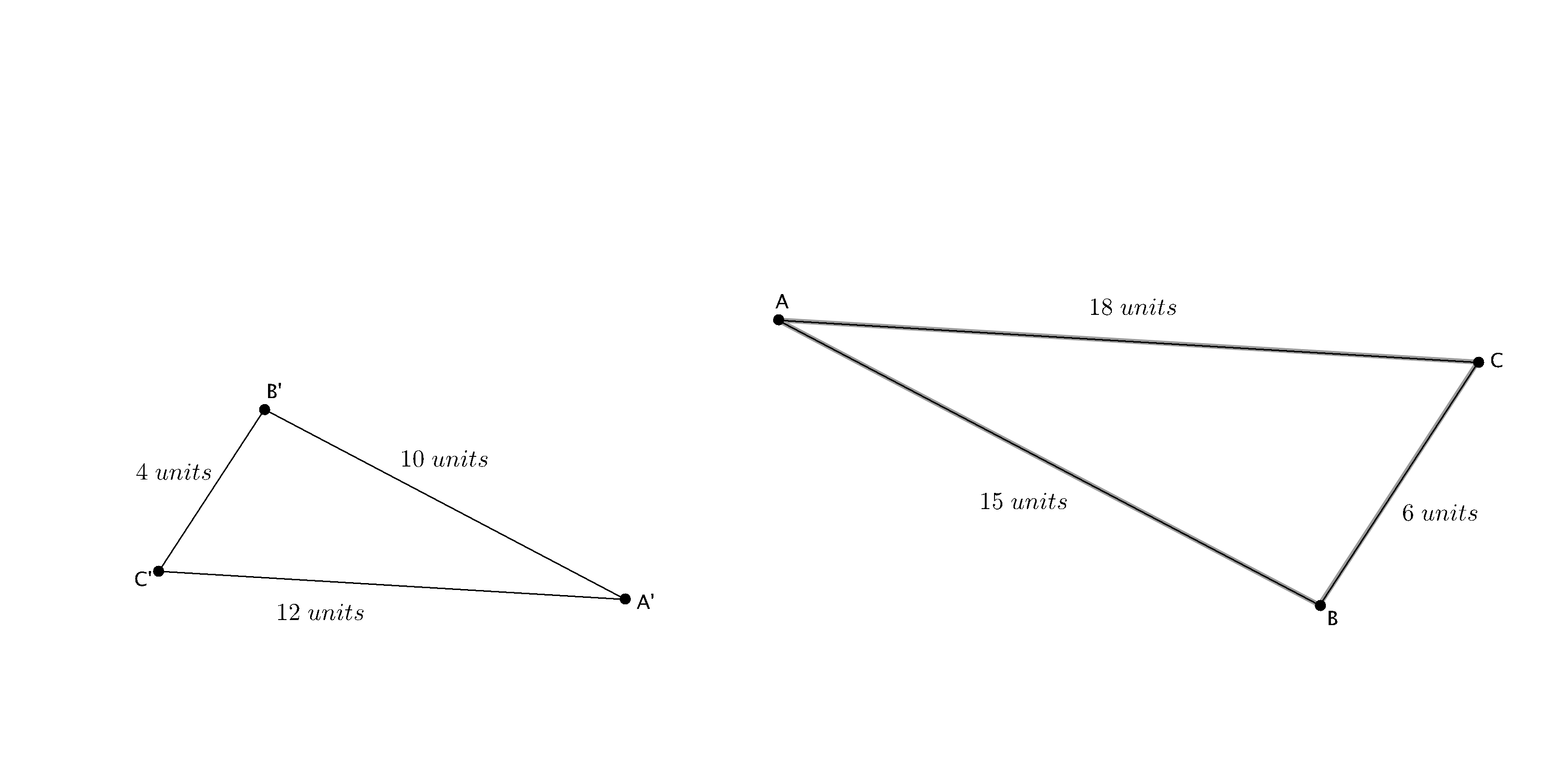
Macintosh HD:Users:shassan:Dropbox:Module 3:Images:Similarity:example1student.pdfIn the picture below, we have a triangle that has been dilated from center by a scale factor of . It is noted by . We also have triangle which is congruent to triangle (i.e., ).

Describe the sequence that would map triangle onto triangle

Exercises 1–4

1. Triangle was dilated from center by scale factor . The dilated triangle is noted by *.* Another triangle is congruent to triangle (i.e., ). Describe a dilation followed by the basic rigid motion that would map triangle onto triangle.

Macintosh HD:Users:shassan:Dropbox:Module 3:Images:Similarity:exer1s.pdf

1. Describe a sequence that would show
2. Are the two triangles shown below similar? If so, describe a sequence that would prove . If not, state how you know they are not similar.
3. Are the two triangles shown below similar? If so, describe a sequence that would prove . If not, state how you know they are not similar.

Macintosh HD:Users:shassan:Desktop:ex3.pdf

Lesson 9: Basic Properties of Similarity (from Module 3)

Classwork

Exploratory Challenge 1

The goal is to show that if is similar to , then is similar to . Symbolically, if , then .

Macintosh HD:Users:shassan:Dropbox:Module 3:Images:Basic Properties of Similarity:explchal1sss.pdf

* 1. First determine whether or not is in fact similar to (If it isn’t, then no further work needs to be done.) Use a protractor to verify that the corresponding angles are congruent and that the ratios of the corresponding sides are equal to some scale factor.
  2. Describe the sequence of dilation followed by a congruence that proves
  3. Describe the sequence of dilation followed by a congruence that proves
  4. Is it true that and ? Why do you think this is so?

Exploratory Challenge 2

Macintosh HD:Users:stefaniehassan:Desktop:explchal2s.pdfThe goal is to show that if is similar to , and is similar to , then is similar to   
 Symbolically, if and , then

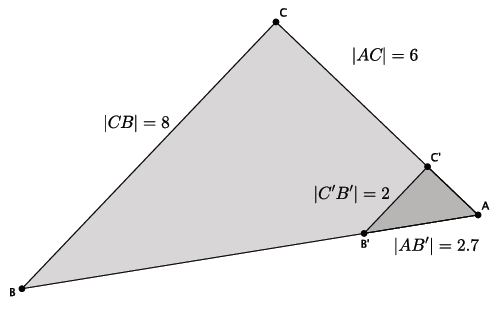
* 1. Describe the similarity that proves
  2. Describe the similarity that proves
  3. Verify that, in fact, by checking corresponding angles and corresponding side lengths. Then describe the sequence that would prove the similarity .
  4. Is it true that if and , then ? Why do you think this is so?

Lesson 11: More About Similar Triangles (from Module 3)

Classwork

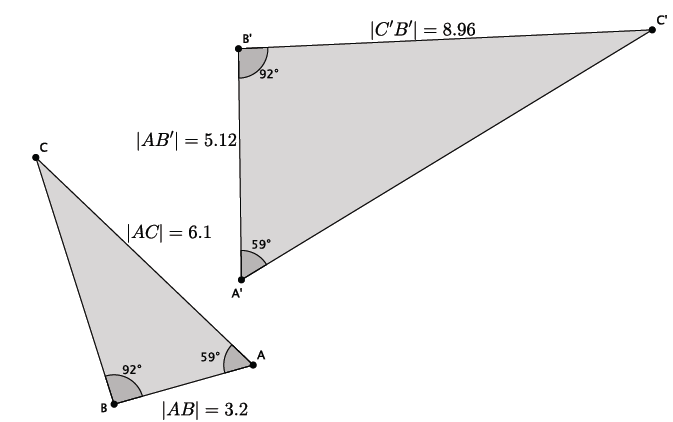
Exercises

1. In the diagram below, you have and Use this information to answer parts (a)–(d).

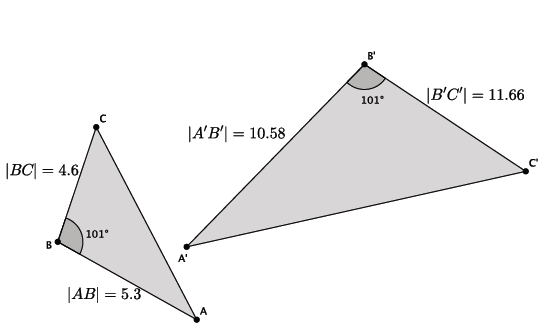


* 1. Based on the information given, is ? Explain.
  2. Assume line is parallel to line . With this information, can you say that ? Explain.
  3. Given that , determine the length of side .
  4. Given that , determine the length of side .

1. In the diagram below, you have and . Use this information to answer parts (a)–(c).



* 1. Based on the information given, is ? Explain.
  2. Given that , determine the length of side .
  3. Given that , determine the length of side .

1. In the diagram below, you have and . Use this information to answer the question below.

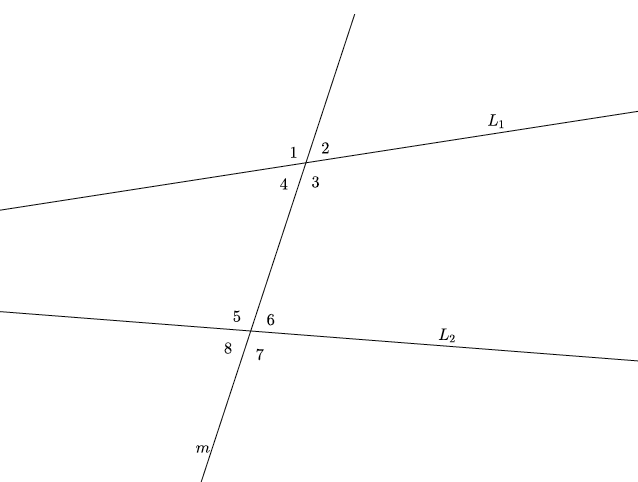
Based on the information given, is ? Explain.

Lesson 12: Angles Associated with Parallel Lines

Classwork

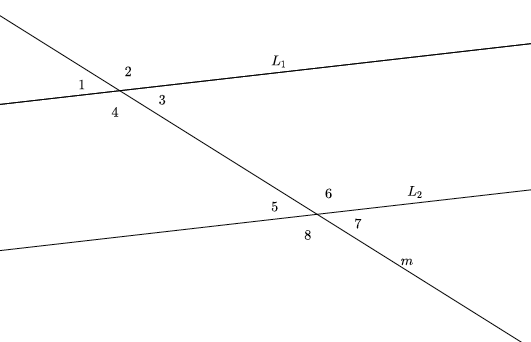
Exploratory Challenge 1

In the figure below, is not parallel to , and is a transversal. Use a protractor to measure angles 1–8. Which, if any, are equal? Explain why. (Use your transparency if needed.)



Exploratory Challenge 2

In the figure below, , and is a transversal. Use a protractor to measure angles 1–8. List the angles that are equal in measure.

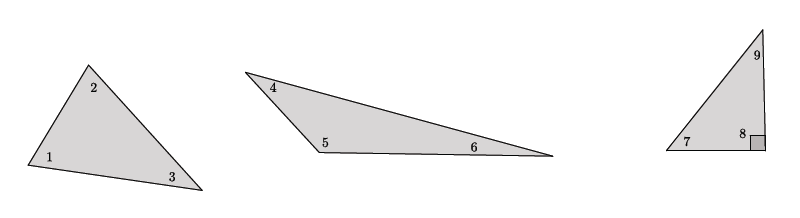


* 1. What did you notice about the measures of and ? Why do you think this is so? (Use your transparency if needed.)
  2. What did you notice about the measures of and ? Why do you think this is so? (Use your transparency if needed.) Are there any other pairs of angles with this same relationship? If so, list them.
  3. What did you notice about the measures of and ? Why do you think this is so? (Use your transparency if needed.) Is there another pair of angles with this same relationship?

Lesson 13: Angle Sum of a Triangle

Classwork

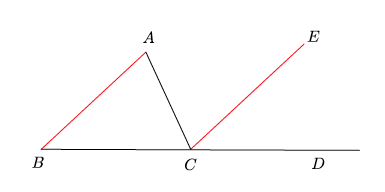
Concept Development



Note that the sum of angles and must equal because of the known right angle in the right triangle.

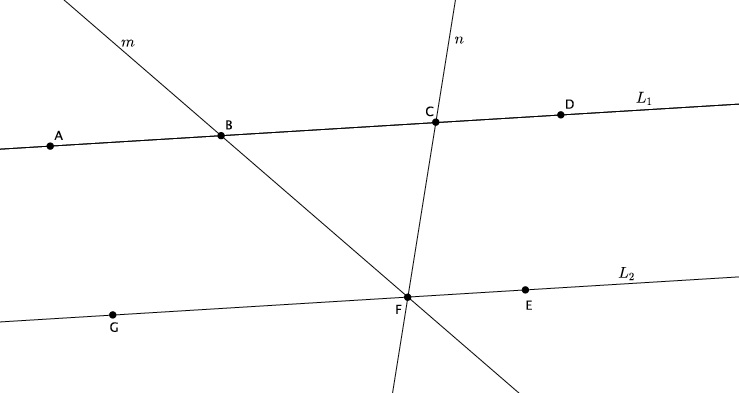
Exploratory Challenge 1

Let triangle be given. On the ray from to , take a point so that is between and . Through point , draw a line parallel to , as shown. Extend the parallel lines and *.* Line is the transversal that intersects the parallel lines.



* 1. Name the three interior angles of triangle .
  2. Name the straight angle.
  3. What kinds of angles are and ? What does that mean about their measures?
  4. What kinds of angles are and ? What does that mean about their measures?
  5. We know that . Use substitution to show that the three interior angles of the triangle have a sum of .

Exploratory Challenge 2

The figure below shows parallel lines and . Let and be transversals that intersect at points and , respectively, and at point , as shown. Let be a point on to the left of , be a point on to the right of , be a point on to the left of and be a point on to the right of .

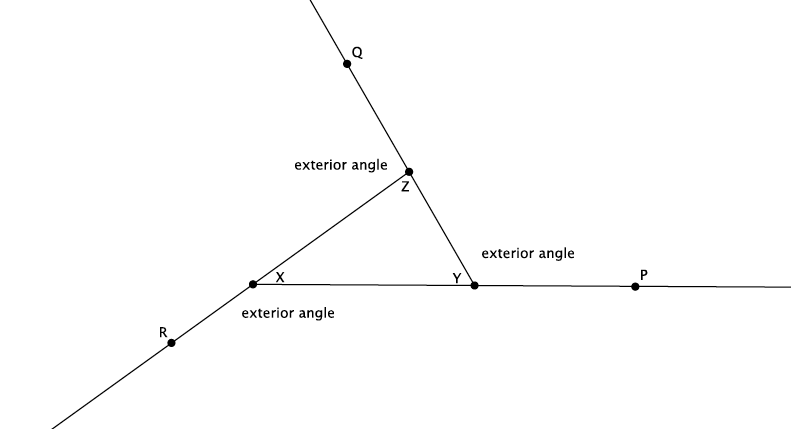
* 1. Name the triangle in the figure.
  2. Name a straight angle that will be useful in proving that the sum of the interior angles of the triangle is .
  3. Write your proof below.

Lesson 14: More on the Angles of a Triangle

Classwork

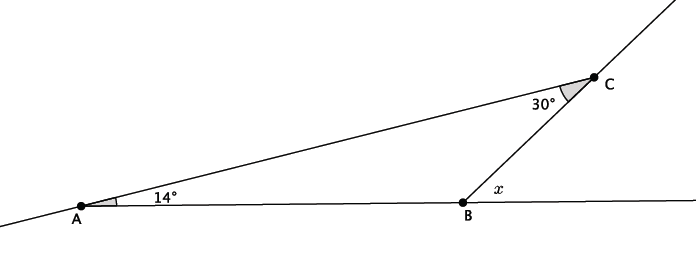
Exercises 1–4

Use the diagram below to complete Exercises 1–4.

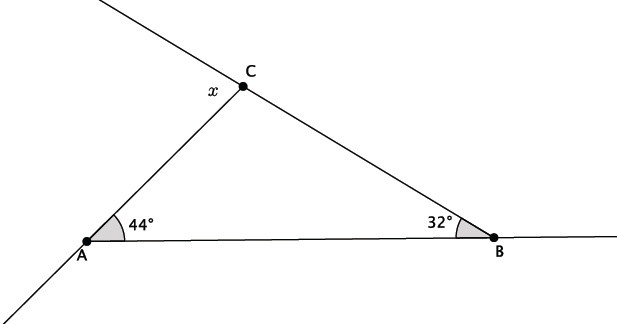


1. Name an exterior angle and the related remote interior angles.
2. Name a second exterior angle and the related remote interior angles.
3. Name a third exterior angle and the related remote interior angles.
4. Show that the measure of an exterior angle is equal to the sum of the related remote interior angles.

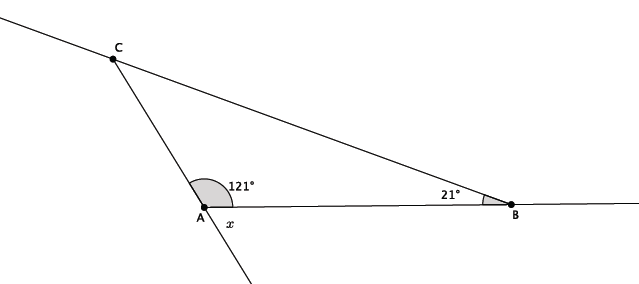
**Example 1**

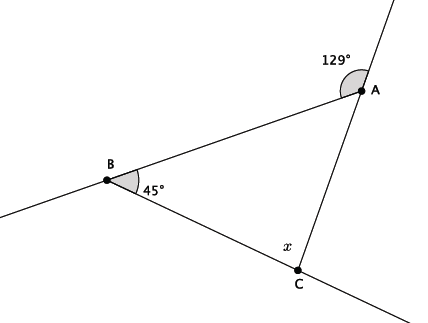
Find the measure of angle .

Example 2

Find the measure of angle .

Example 3

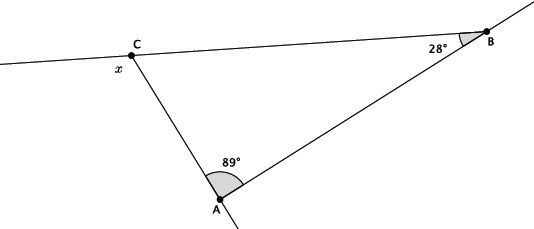
****Find the measure of angle

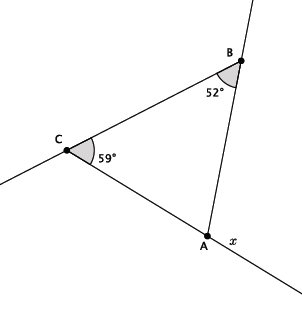
****Example 4

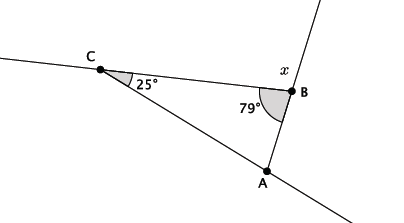
Find the measure of angle .

Exercises 5–10

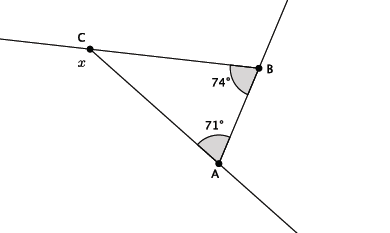
1. Find the measure of angle . Present an informal argument showing that your answer is correct.



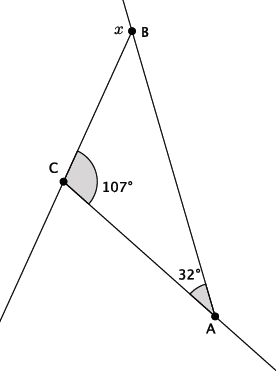
1. Find the measure of angle . Present an informal argument showing that your answer is correct.
2. Find the measure of angle . Present an informal argument showing that your answer is correct.



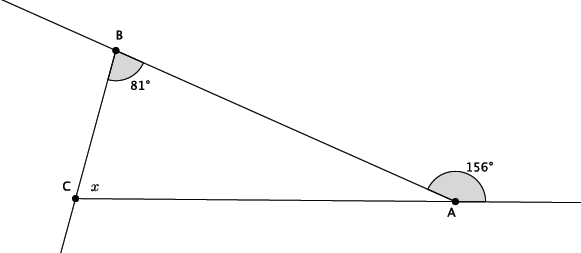
1. Find the measure of angle . Present an informal argument showing that your answer is correct.



1. Find the measure of angle . Present an informal argument showing that your answer is correct.



1. Find the measure of angle . Present an informal argument showing that your answer is correct.



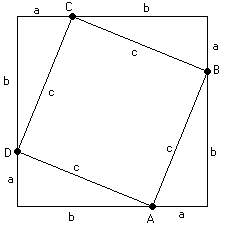
Lesson 15: Informal Proof of the Pythagorean Theorem

Classwork

**Pythagorean Theorem:**

**Examples:**

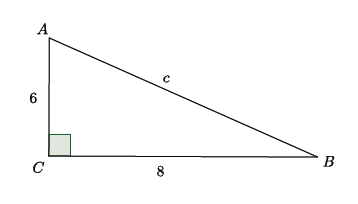
**Proof:**



**Example 1**

Now that we know what the Pythagorean theorem is, let’s practice using it to find the length of a hypotenuse of a right triangle.

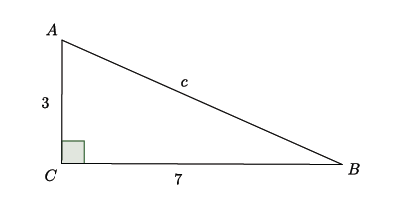
Determine the length of the hypotenuse of the right triangle.



The Pythagorean theorem states that for right triangles , where and are the legs and is the hypotenuse. Then,

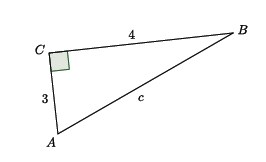
Since we know that , we can say that the hypotenuse .

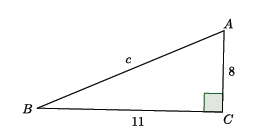
**Example 2**

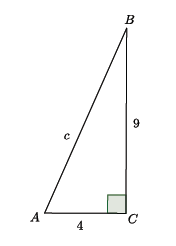
Determine the length of the hypotenuse of the right triangle.

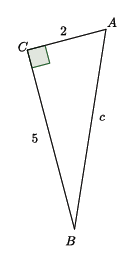
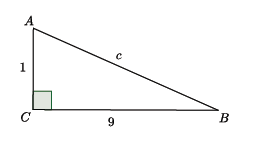
Exercises 1–5

For each of the exercises, determine the length of the hypotenuse of the right triangle shown. Note: Figures not drawn to scale.

1. 





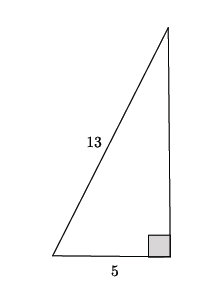
1. 
2. 

Lesson 16: Applications of the Pythagorean Theorem

Classwork

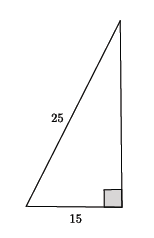
**Example 1**

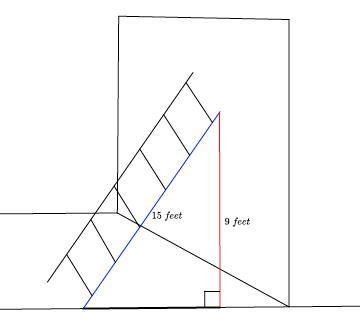
Given a right triangle with a hypotenuse with length units and a leg with length units, as shown, determine the length of the other leg.



The length of the leg is units.

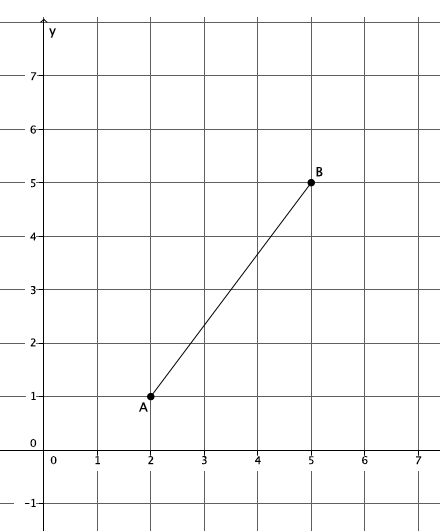
Exercises 1–2

1. Use the Pythagorean theorem to find the missing length of the leg in the right triangle.
2. You have a -foot ladder and need to reach exactly feet up the wall. How far away from the wall should you place the ladder so that you can reach your desired location?

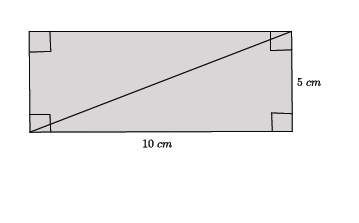


Exercises 3–6

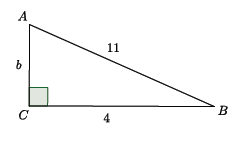
1. Find the length of the segment , if possible.



1. Given a rectangle with dimensions cm and cm, as shown, find the length of the diagonal, if possible.



1. A right triangle has a hypotenuse of length in. and a leg with length in. What is the length of the other leg?
2. Find the length of in the right triangle below, if possible.

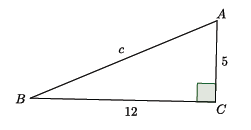


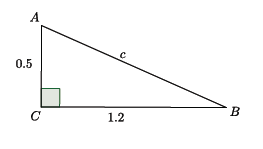
Lesson 13: Proof of the Pythagorean Theorem (from Module 3)

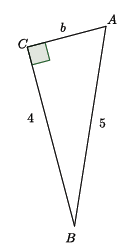
Classwork

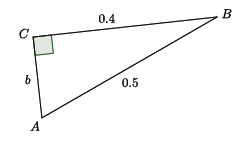
Exercises 1–3

Use the Pythagorean Theorem to determine the unknown length of the right triangle.

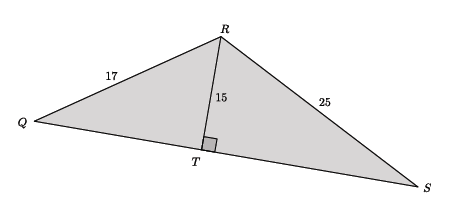
1. Determine the length of side in each of the triangles below.
   1. 

* 1. 

1. Determine the length of side in each of the triangles below.
   1. 

* 1. 

1. Determine the length of . (Hint: Use the Pythagorean Theorem twice.)

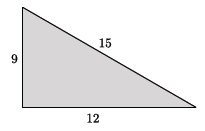


Lesson 14: The Converse of the Pythagorean Theorem (from Module 3)

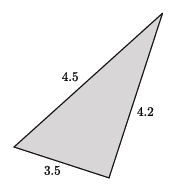
Classwork

Exercises 1–7

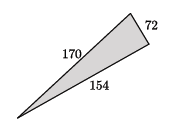
1. The numbers in the diagram below indicate the units of length of each side of the triangle. Is the triangle shown below a right triangle? Show your work, and answer in a complete sentence.



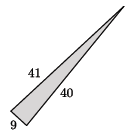
1. The numbers in the diagram below indicate the units of length of each side of the triangle. Is the triangle shown below a right triangle? Show your work, and answer in a complete sentence.



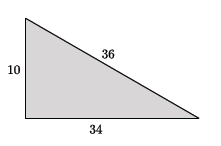
1. The numbers in the diagram below indicate the units of length of each side of the triangle. Is the triangle shown below a right triangle? Show your work, and answer in a complete sentence.



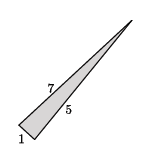
1. The numbers in the diagram below indicate the units of length of each side of the triangle. Is the triangle shown below a right triangle? Show your work, and answer in a complete sentence.



1. The numbers in the diagram below indicate the units of length of each side of the triangle. Is the triangle shown below a right triangle? Show your work, and answer in a complete sentence.



1. The numbers in the diagram below indicate the units of length of each side of the triangle. Is the triangle shown below a right triangle? Show your work, and answer in a complete sentence.



1. The numbers in the diagram below indicate the units of length of each side of the triangle. Is the triangle shown below a right triangle? Show your work, and answer in a complete sentence.

